

physics



BHW

Note : Four possible choices A, B, C, D to each question are given. Which choice is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

Q.No.1	A pair of quark and anti quark makes a :
(1)	(A) Meson (B) Baryon (C) Lepton (D) Hadron
(2)	The first orbit in the Hydrogen Atom has a radius : (A) 5.3×10^{-11} m (B) 5.3×10^{11} m (C) 3.5×10^{-11} m (D) 3.5×10^{11} m
(3)	The Rest Mass Energy of an Electron Positron pair is : (A) 0.51 Mev (B) 1.02 Mev (C) 1.2 Mev (D) 1.00 Mev
(4)	The factor $\frac{h}{m_0 c}$ in the Compton Equation has the dimension of : (A) Pressure (B) Length (C) Mass (D) Momentum
(5)	The Boolean Equation for Exclusive OR Gate is given by : (A) $X = A \cdot B + B \cdot A$ (B) $X = \overline{A} \cdot \overline{B} + \overline{A} \cdot B$ (C) $X = \overline{A} \cdot \overline{B} + A \cdot B$ (D) $X = A \cdot B + \overline{A} \cdot \overline{B}$
(6)	Thickness of a base in a transistor is of the order of : (A) 10^{-3} m (B) 10^{-9} m (C) 10^{-6} m (D) 10^{-6} mm
(7)	Which one pair belongs to acceptor impurity : (A) Arsenic, Phosphorous (B) Boron, Gallium (C) Antimony, Indium (D) Arsenic, Antimony
(8)	The Curi Temperature of Iron is : (A) 125°C (B) 163°C (C) 750 K (D) 750°C
(9)	If the frequency of A.C. Supply is doubled then the reactance of the capacitor is : (A) Half (B) Two Times (C) Four Times (D) One Fourth
(10)	In three phase A.C. Generator, Phase difference between each pair of the coil is : (A) 90° (B) 270° (C) 120° (D) 180°
(11)	One Henry is equal to : (A) VS^{-1}A (B) VSA^{-1} (C) V^{-1}SA (D) VSA^{-1}
(12)	If Motor is over-loaded, magnitude of back emf : (A) Increase (B) Decrease (C) Zero (D) Remains Constant
(13)	One Tesla is equal to : (A) NmA^{-1} (B) N^{-1}mA (C) $\text{NA}^{-1}\text{m}^{-1}$ (D) NAm
(14)	For a current carrying solenoid the term "n" has units as : (A) No Unit (B) m^{-1} (C) m^{-2} (D) m^{-3}
(15)	What is the resistance of a carbon resistor which has bands brown, black and brown : (A) 100 Ohm (B) 1000 Ohm (C) 10 Ohm (D) 1.0 Ohm
(16)	Coulomb Per Volt is called : (A) Farad (B) Ampere (C) Joule (D) Henry
(17)	If the distance between two charges is halved and charges are also doubled, then force between them will be : (A) Two Times (B) Four Times (C) Eight Times (D) Sixteen Times
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Roll No.	911 - 30000	New Pattern / Group Ist	Session (2015 - 17) to (2016 - 18)
Physics (Subjective)	Inter-A-2018	Inter (Part - II)	Time : 2:40 Hours Marks : 68

Note : It is compulsory to attempt any (8-8) parts each from Q.No.2 and Q.No.3 and attempt any (6) parts from Q.No.4 .
Attempt any (03) questions from Part II. Write same Question No. and its Part No. as given in the question paper.

Make diagram where necessary.

Part - I

B H W

22 x 2 = 44

Q.No.2 (i) Define Electrostatics and Electric Force.

- (ii) Define Xerography and Photoconductor.
- (iii) Electric Lines of Force never cross, why?
- (iv) How can you identify that which plate of a capacitor is positively charged?
- (v) Define Magnetic Flux and Flux Density with units.
- (vi) Define Stable Galvanometer and Ohmmeter.
- (vii) Why the Voltmeter should have a very high resistance?
- (viii) Why does the picture on a T.V. Screen become distorted when a magnet is brought near the screen?
- (ix) Define Mutual Induction and Henry.
- (x) Define Induced emf and back emf of a motor.
- (xi) Can a Step-Up Transformer increase the power level?
- (xii) In a transformer, there is no transfer of charge from the primary to the secondary. How is then the power transferred?

Q.No.3 (i) How many electrons pass through an electric bulb in one minute if the 300 mA current is passing through it?

- (ii) Explain why the terminal potential difference of a battery decreases when the current drawn from it is increased?
- (iii) What is Thermistor? Describe its main uses.
- (iv) A circuit contains an iron-cored inductor, a switch and D.C. source arranged in series. The switch is closed and after an interval re-opened. Explain why a spark jumps across the switch contacts.
- (v) Describe some advantages of a 3-Phase A.C. Supply.
- (vi) Find the Capacitance required to construct a resonance circuit of frequency 1000 kHz with an inductor of 5 mH.
- (vii) Differentiate between Tensile and Shear Modes of Stress and Strain.
- (viii) Show that dimensions of Stress and Young's Modulus are the same.
- (ix) What is meant by Para and Ferromagnetic Substances? Give examples of each.
- (x) What is the effect of Forward Biasing and Reverse Biasing of Diode on the Width of Depletion Region?
- (xi) Draw the Symbol of Exclusive OR Gate and write its Truth Table.
- (xii) Why is a Photo-Diode operated in Reverse Biased State?

Q.No.4 (i) State and write formula for Compton Effect.

- (ii) When does light behave as a Wave? when does it behave as a particle?
- (iii) Which has the higher energy quanta? Radio Waves or X-rays and why?
- (iv) What do we mean when we say that Atom is excited?
- (v) How LASER is used in medical? Give two uses only.
- (vi) What is meant by Critical Mass and Critical Volume?
- (vii) What is the term dead time for GM Counter?
- (viii) What do you understand by Back Ground Radiation? Explain.
- (ix) What is Radioactive Tracer? Give its use in industry.

Part - II

Q.No.5 (a) What is Wheatstone Bridge? Describe its construction and how can it be used to measure the unknown resistance? (5)

(b) A point charge $q = -8.0 \times 10^{-8} \text{ C}$ is placed at origin. Calculate electric field at a point 2.0 m from the origin on the z-axis. (3)

Q.No.6 (a) What do you mean by A.C. Generator and what is its working principle? By drawing its figure explain its construction. Also derive the relation for Voltage and Current Produced by it. (5)

(b) The resistance of Galvanometer is 50.0Ω and reads full scale deflection with a current of 2.0 mA. Show by a diagram how to convert this Galvanometer into Voltmeter reading 200 V full scale. (3)

Q.No.7 (a) What is an Amplifier? Discuss action of a transistor as a voltage amplifier. Also derive formula for voltage gain. (5)

(b) A 10 mH, 20Ω coil is connected across 240 V and $180/\pi$ Hz source. How much power does it dissipate? (3)

Q.No.8 (a) What are N-Type and P-Type materials? How can these be obtained? Explain. (5)

(b) A 50 KeV photon is Compton scattered by a quasi free electron. If the scattered photon comes off at 45° , what is its Wavelength? (3)

Q.No.9 (a) What are Inner Shell Transitions? How X-rays are produced? Give its two properties. (5)

(b) The Half Life of $^{91}_{30}\text{Sr}$ is 9.70 Hours. Find its Decay Constant. (3)

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Q.No.1	Electric Flux is expressed as :
(1)	(A) $\phi_e = \vec{E} \times \vec{A}$ (B) $\phi_e = \vec{E} \cdot \vec{Q}$ (C) $\phi_e = \vec{E} \cdot \vec{A}$ (D) $\phi_e = EA^2$
(2)	The force between two charges is 28 N. If Paraffin Wax of relative permittivity 2.8 is introduced between the charges as medium, then the force reduces to : (A) 25 N (B) 20 N (C) 15 N (D) 10 N
(3)	What is the colour code for $52 M\Omega \pm 5\%$ resistance : (A) Red Green Blue Gold (B) Green Red Blue Gold (C) Yellow Red Blue Gold (D) Green Red Violet Gold
(4)	If length of Solenoid is doubled but N same, \vec{B} inside the Solenoid becomes : (A) Half (B) Double (C) One Fourth (D) Four Times
(5)	Which one has the Least Resistance : (A) Galvanometer (B) Ammeter (C) Voltmeter (D) Ohm Meter
(6)	A 50 mH coil carries a current of 2 Amp. The energy stored in its magnetic field is : (A) 0.05 J (B) 0.1 J (C) 10 J (D) 50 J
(7)	The Practical Illustration of the Phenomenon of mutual induction is in the device of : (A) Transformer (B) A.C. Generator (C) D.C. Generator (D) Ammeter
(8)	The device which allows only the flow of D.C. is : (A) Capacitor (B) Transformer (C) Inductor (D) Generator
(9)	The inductive reactance of a coil is directly proportional to : (A) Inductance (B) Resistance (C) Frequency of A.C. (D) Both Frequency of A.C. and Inductance
(10)	Glass and High Carbon Steel are examples of : (A) Ductile Substances (B) Brittle Substances (C) Soft Substances (D) Hard Substances
(11)	The Resistance between the Inverting (-) and Non-Inverting (+) inputs is called Input Resistance and is of the order of : (A) Ohms (B) Kilo Ohms (C) Thousands Ohms (D) Mega Ohms
(12)	For Automatic Switching of Street Light, the Op-Amplifier is used as : (A) Inverter (B) Converter (C) Comparator (D) Rectifier
(13)	The maximum K.E. of Photoelectron depends upon : (A) Intensity of Incident Light (B) Frequency of Incident Light (C) Metal (D) Temp. of Metal
(14)	The materialization of energy takes place in the process of : (A) Photoelectric Effect (B) Compton Effect (C) Pair Production (D) Annihilation of Matter
(15)	The Rest Mass of X-ray photon is (A) 9.1×10^{-31} Kg (B) 1.67×10^{-27} Kg (C) 1.6×10^{-19} Kg (D) Zero
(16)	In Liquid Metal Fast Breeder reactor, the type of Uranium used is : (A) ${}_{92}^{235}\text{U}$ (B) ${}_{92}^{238}\text{U}$ (C) ${}_{92}^{234}\text{U}$ (D) ${}_{92}^{239}\text{U}$
(17)	If we have N_0 number of atoms of any Radioactive Element, then after four half lives, the number of atoms left behind is : (A) $\frac{1}{4} N_0$ (B) $\frac{1}{8} N_0$ (C) $\frac{1}{16} N_0$ (D) $\frac{1}{2} N_0$



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Make diagram where necessary.

Part - I

22 × 2 = 44

Q.No.2 (i) Write four characteristics of Electric Field Lines.

- Differentiate between Electric Potential Energy and Electric Potential Difference.
- How can you identify that which plate of a capacitor is positively charged?
- Show that $1 \text{ Vm}^{-1} = 1 \text{ NC}^{-1}$.
- What do you know about Sensitivity of Galvanometer?
- What is the function of Grid in CRO?
- How can you use a Magnetic Field to separate Isotopes of Chemical Element?
- Why the Resistance of an Ammeter should be very low?
- What is the Back Motor Effect in Generators?
- Distinguish between A.C. Generator and Transformer.

(x) Show that \mathcal{E} and $\frac{\Delta\phi}{\Delta t}$ have the same units.

(xi) Can a D.C. Motor be turned into D.C. Generator? What changes are required to be done?

Q.No.3 (i) Is the filament resistance lower or higher in a 500 W, 220 V light bulb than in a 100 W, 220 V bulb?

- Why does the Resistance of a Conductor rise with temperature?
- State Ohm's Law and Basic Principle of Electroplating.
- How does doubling the frequency affect the reactance of : (a) An Inductor (b) A capacitor
- What is meant by A.M. and F.M.?
- Define Choke and Impedance.
- What is meant by Para and Ferromagnetic Substances? Give examples for each.
- Define Stress and Strain.
- What is meant by Super Conductor?
- What is OR Gate?
- Why is Base Current in a Transistor is very small?
- Define Digital System and Logic Gates.

Q.No.4 (i) If the speed of light were infinite, what would the equations of special theory of Relativity reduce to?

- Photon A has twice the energy of Photon B. What is the ratio of the Momentum of A to that of B?
- When does light behave as a Wave? When does it behave as a particle?
- Is energy conserved when an atom emits a photon of light?
- What are the advantages of Laser over Ordinary Light?
- Why are Heavy Nuclei unstable?
- How can Radioactivity help in the treatment of Cancer?
- What are Leptons? Give examples of Leptons?
- What do we mean by the term "Critical Mass"?

Part - II

Q.No.5 (a) What is Wheatstone Bridge? Give its principle, construction and working. How it is used to find the unknown low resistance? (5)

(b) A proton placed in a uniform electric field of 5000 NC^{-1} directed to right is allowed to go through a distance of 10.0 cm. Calculate Potential difference between two points work done and velocity. (3)

Q.No.6 (a) Derive an expression for Force acting on moving charge particle in uniform magnetic field. Hence define Tesla. (5)

(b) The back emf in a motor is 120 V when the motor is turning at 1680 rev per min. What is the back emf when the motor turns 3360 rev per min? (3)

Q.No.7 (a) Explain the working of Series Resonance Circuit. Write down its any four properties. (5)

(b) A 10 mH, 20Ω coil is connected across 240 V and $180/\pi$ Hz source. How much power does it dissipate? (3)

Q.No.8 (a) What are Intrinsic and Extrinsic Semi Conductors? Describe the formation of N-type and P-type Semi Conductors. (5)

(b) A Sodium Surface is illuminated with a light of Wavelength 300 nm. The work function of Sodium Metal is 2.46 eV. (a) Find the maximum K.E. of Ejected Electron. (3)

(b) Determine the Cut Off Wavelength for Sodium. (3)

Q.No.9 (a) Describe the Principle, Construction and Working of a Wilson Cloud Chamber. (5)

(b) A tungsten target is struck by electrons that have been accelerated from rest through 40 kV potential difference Find the shortest Wavelength of the Bremsstrahlung Radiation emitted. (3)